

TABLE OF CONTENTS



The 2001 Stream Water Quality Report is produced by the Division of Environmental Health of the Fairfax County Health Department.

Staff support is provided by the Division's Monitoring and Environmental Services staff, who collected, compiled and interpreted the stream sampling results for the year.

This and prior years reports are available on Fairfax County's Internet site at:

<http://www.fairfaxcounty.gov/service/hd/strannualrpt.htm>

Streams on the cover are from the Little Rocky Run Watershed. Sites 28-01 and 28-02. Note the orange retention fence in the lower left picture.

2001 Stream Water Quality Report Fairfax County Health Department

Introduction

Abstract	2
--------------------------------	---

Section 1 - Survey Results

Fecal Coliforms	3-5
Dissolved Oxygen	6
Nitrate Nitrogen	6-7
pH	7
Phosphorous (Total)	8
Temperature	8
Heavy Metals	9
Lake Accotink	9
Fairfax City Streams	10-11
Water Quality Summary Statement	11

Section 2 - Water Quality Programs

Adopt-A-Stream	11-12
Stream Complaints	12

Section 3 - Appendix

A- Laboratory Procedures	13
B- Watersheds and Sampling Sites	13
C- Data Tables and Calculations	14
D- Stream Water Quality Report Background	14-15

Section 4 - Data Tables

Table 1- Stream Sampling Data	17
Table 2- Fecal Coliform Samples	18-20
Table 3- Percent Fecal Coliforms by Watershed	21
Table 4- Fecal Coliforms by Supervisor District	22-23
Table 5- Dissolved Oxygen	24-26
Table 6- Nitrate Nitrogen, pH, Phosphorous	27-29
Table 7- Nitrate Nitrogen by Watersheds	30
Table 8- pH by Watersheds	31
Table 9- Total Phosphorous by Watersheds	32
Table 10- Temperature Ranges	33
Table 11- Lake Accotink	34
Table 12- City of Fairfax	35
Table 13- Heavy Metals	36-42

Section 5 - Stream Sampling Sites

Fairfax City	44
Fairfax County	45-48

Fairfax County Health Department Stream Water Quality Report

2001 Stream Water Quality Report

Abstract

The 2001 Stream Water Quality Report includes data collected from 84 sampling sites throughout 25 of 30 watersheds in Fairfax County. These sampling sites are representative of all the streams monitored within these watersheds. A total of 1,656 stream visits were made for collecting stream samples in 2001. The data in this report shows fluctuations in the stream water quality for individual sampling sites. The overall water quality of the watershed is considered fair for fecal coliforms and good for chemical and physical parameters.

A new data system for entry of stream sample results was initiated by the Health Department Laboratory in 2001.

The Health Department in 2001 investigated a total of 12 stream complaints.

Sampling Result Highlights

- 1,656 stream samples collected from 84 Sites.
- The stream samples in the good water quality range (<200 f.c./100 ml) for fecal coliform is 15% for 2001.
- Total phosphates, nitrate nitrogen, dissolved oxygen and pH levels remain consistent with the 5-year averages.

FIVE YEAR COMPARISON SUMMARY (1997 - 2001)*

FECAL COLIFORM (F.C./100ML)	1997	1998	1999	2000	2001
	18	9	13	14	15
% Fecal Coliform <200 f.c./100ml	829	689	758	544	569
Fecal Coliform Mean**					
PHYSICAL PARAMETERS	1997	1998	1999	2000	2001
	36	39	41	38	36
Rainfall (Sum in inches)	54	57	55	54	55
Sample Temperature (°F)***					
CHEMICAL PARAMETERS	1997	1998	1999	2000	2001
	0.10	0.11	0.10	0.10	0.10
Total Phosphorous (mg/l)**	0.74	0.61	0.65	0.60	0.60
Nitrate Nitrogen (mg/l)**	9.2	8.9	11.3	9.2	8.6
Dissolved Oxygen (mg/l)**	7.3	7.2	7.3	7.1	7.2
pH**					

* Calculations based on all samples collected for each year

** Results for five year comparisons are calculated as a Geometric Mean.

*** Arithmetic Mean

SECTION 1

2001 SURVEY RESULTS

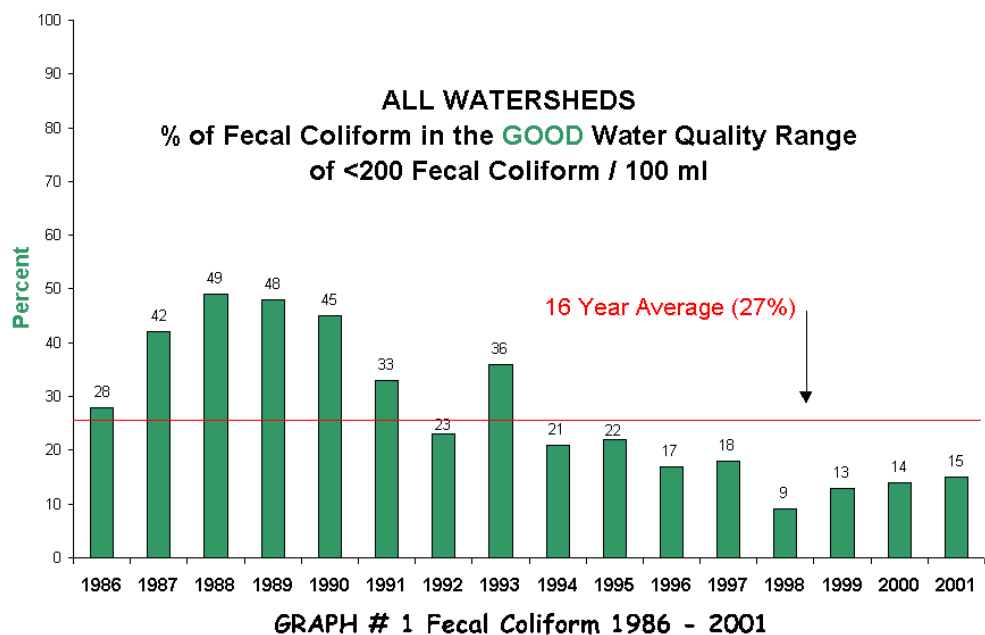
I. Fecal Coliform

Criteria: *Water quality standards include fecal coliform bacteria standards. These “indicator organisms”, while not necessarily harmful in themselves, are found in the intestinal tracts of warm-blooded animals, including humans, and therefore, can be indicative of fecal contamination and the possible presence of a pathogenic organism. In surface waters, the fecal coliform bacteria should not exceed 200 fecal coliform bacteria per 100 ml of water.*

Grab samples are collected by Health Department personnel and transported to the Fairfax County Laboratory where the samples are evaluated by the membrane filter method.

The fecal coliform bacteria standard is used to evaluate waters for all types of recreation. Prior to 1977, the coliform bacteria standards identified waters used for "secondary contact recreation", e.g., - boating or fishing (200 - 1000/ 100 ml). In the 1977 amendments to Virginia's Water Quality Standards, the Department of Environmental Quality-Water (DEQW) adopted the more stringent bacteria standard for primary contact recreation to apply to all surface waters of the State. This action was taken as part of Virginia's commitment to attain the national goal of water quality suitable for all types of recreation.

The Department of Environmental Quality-Water (DEQW) has established a criteria for all surface waters, except shellfish waters, as follows "...the fecal coliform bacteria shall not exceed a geometric mean¹ of 200 fecal coliform bacteria per 100 ml of water for two or more samples over a 30 day period, or a fecal coliform (f.c.) bacteria level of 1,000 per 100 ml at any time."² In 2001 the percentage of samples in the good water quality range (<200 f.c./100ml) increased to 15%, see Graph # 1.

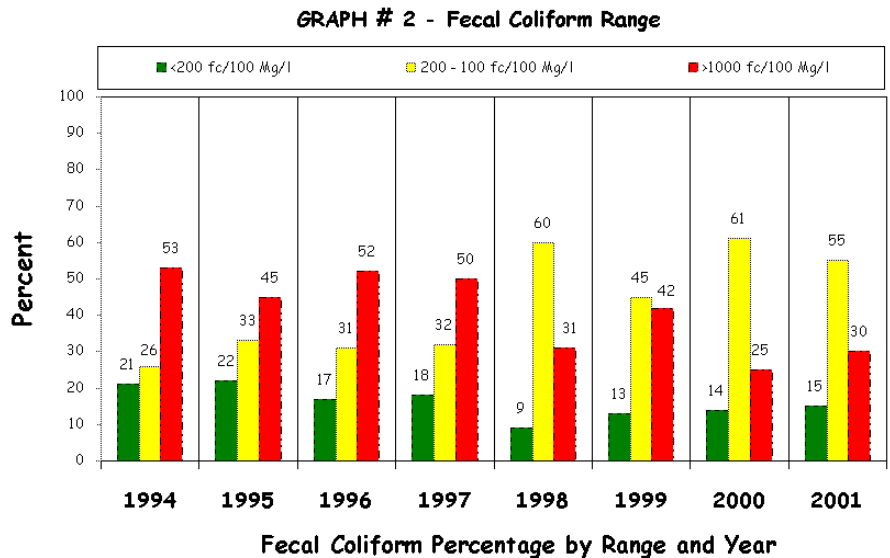


¹ The Geometric Mean is defined as the antilog of the average of the logarithms of the data values.

² "Water Quality Standards" Commonwealth of Virginia State Water Control Board Regulations July 1, 1988 page 19.

A decrease in the number of samples in the > 1,000 f.c./100 ml was noted in 1998 (31%). In 1999 the number of samples in the > 1,000 f.c./100 ml range increased to 42% followed by a decrease to 25% in 2000. In 2001 the number of samples >1,000 f.c./100ml increased to 30%.

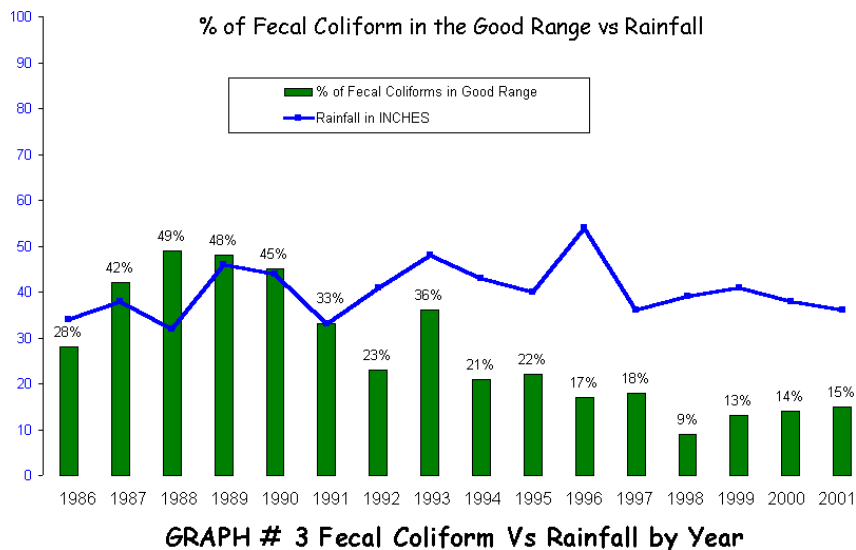
The movement of the number of samples within the >1, 000 f.c./100 ml range may reflect a seasonal variation and may not be a significant indicator of improvement Graph # 2.



Factors affecting the increase or decrease in the amount of fecal coliform in stream waters include rainfall amounts and the sample water temperature. Both of these factors are noted in past years' reports as environmental conditions affecting the fecal coliform results.

The first, increased rainfall may affect fecal coliforms through dilution, allowing the streams to be more efficient in their self-cleansing action resulting in a decrease in the amount of fecal coliforms in the stream water. The normal action of the streams kills the majority of fecal coliform organisms introduced into them by oxidation and the lack of ideal habitat for the organisms. The fecal coliform organism is present in the fecal material of all warm-blooded animals and generally is deposited in the stream from rainfall events, which flush streets, lawns, gardens and woodlands. The average number of fecal coliform organisms discharged from the human body is about 400 billion per day. It

is estimated that levels of 250,000 f.c./100 ml of water in streams are indicative of direct sewage discharge.



The assumption that an increase in rainfall would improve the water quality through self-cleansing of the streams by increased flow during the rainfall incidences has not been proven. A comparison of the percentage of fecal coliforms and the annual rainfall has not indicated a better water quality trend in this or past annual samplings. Several factors including sampling time (i.e. before or after significant rainfall),

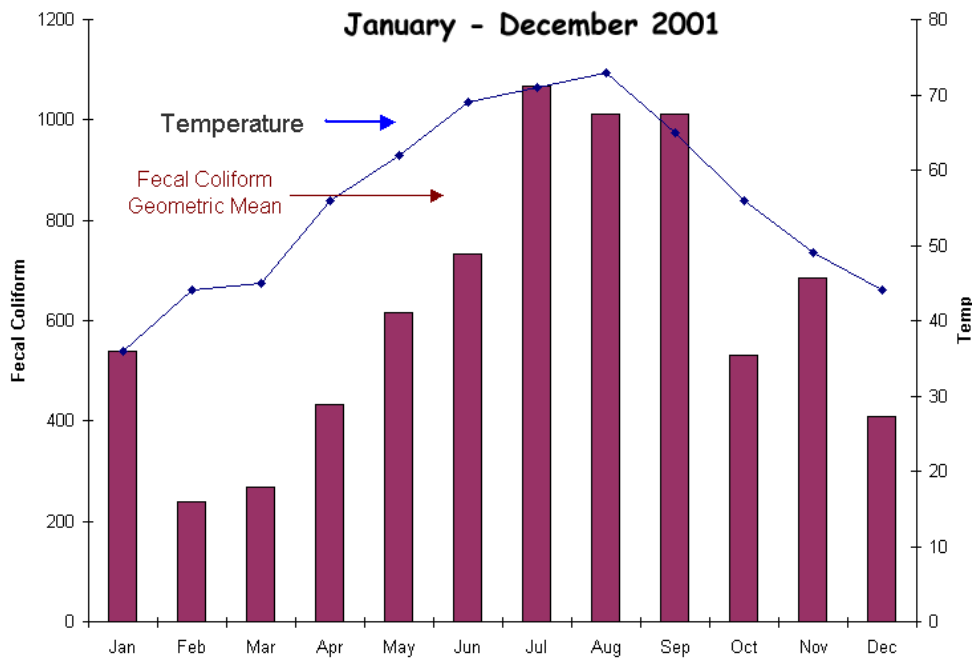
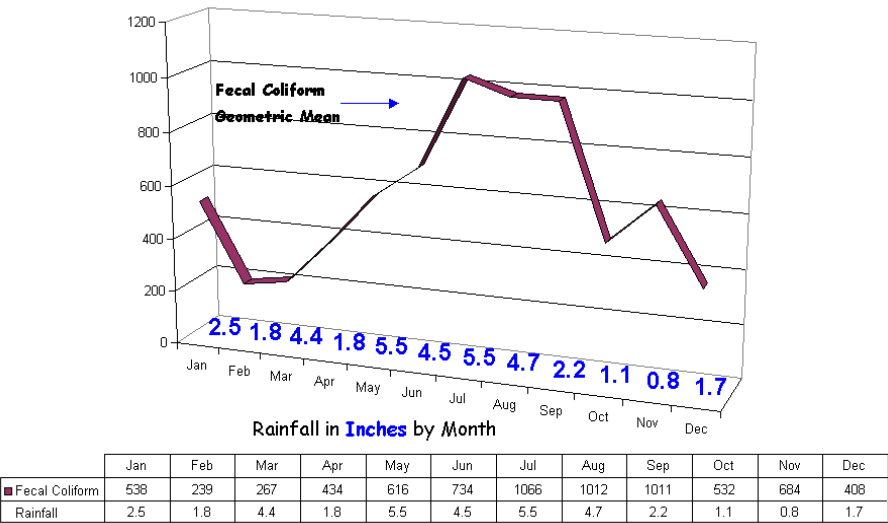
location of samples collected within the watershed (upper, middle or lower) and the general urbanization of the county make it difficult to see any self-cleansing action in the streams.

In 2001 the amount of rainfall decreased to 36", down from 41" in 1999 (Graph #3). This did not reflect an appreciable increase or decrease in the good water quality levels for the year.

A further analysis of the rainfall by month in 2001 indicates a drop in rainfall during the fall months October - November. July was the highest monthly average for fecal coliforms of 1061 fc/100ml and had one of the highest rainfall averages of the year, 5.5 inches (Graph # 4).

The monthly fecal coliform levels did not appear to follow any **direct** relationship to the amount of rainfall. There were higher fecal coliform numbers in samples collected during the months when the rainfall was the highest (Graph # 4). The increase in fecal coliforms may be related more to temperature than rainfall.

Graph #4 Fecal Coliform Vs Rainfall by Month in 2001



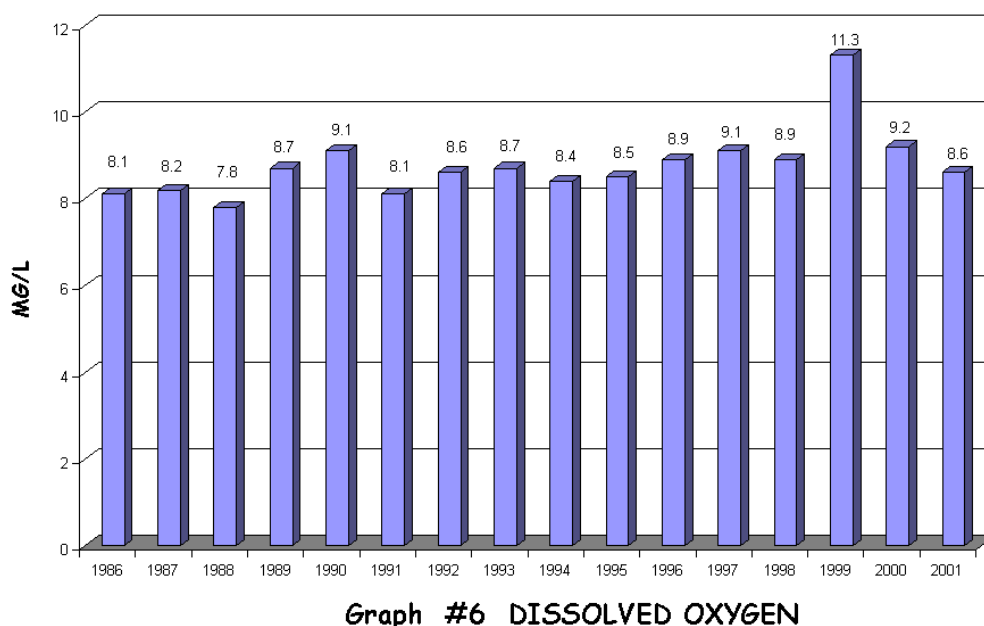
Graph # 5 Fecal Coliform vs Temperature by Month

The second factor, water temperature, may be contributing to an increase in the fecal coliform Geometric Mean by providing optimum temperatures for coliform growth. The overall trend was an increase in fecal coliform during the summer months with three months (Jan, Aug and Oct) not following the temperature curve. January was higher than expected and a decrease was noted in August and October. (Graph #5).

II. Dissolved Oxygen

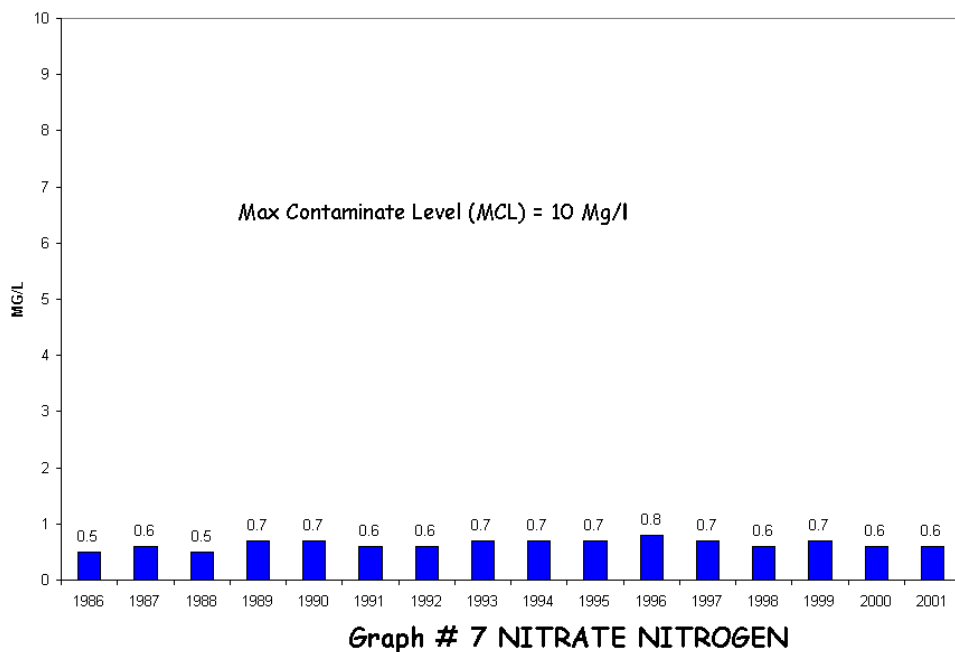
Criteria: *The presence of dissolved oxygen (D.O.) in water is essential for aquatic life, and the type of aquatic community is dependent to a large extent on the concentration of dissolved oxygen present. Dissolved oxygen standards are established to ensure the growth and propagation of aquatic ecosystems. The minimum standard for dissolved oxygen is 4.0 mg/l.*

Ninety-nine percent (99%) of the samples collected for determination of dissolved oxygen (D.O.) were above 4.0 mg/l. Thirty-five percent of the samples below 4.0 mg/l were from two sampling sites 24-01 (Wolf Run Creek) and 14-03 (Little Hunting Creek). The majority (50%) of the samples below 4.0 mg/l was related to low rainfall during the months of September (2.2 inches) and November (0.8 inches).



III. Nitrate Nitrogen

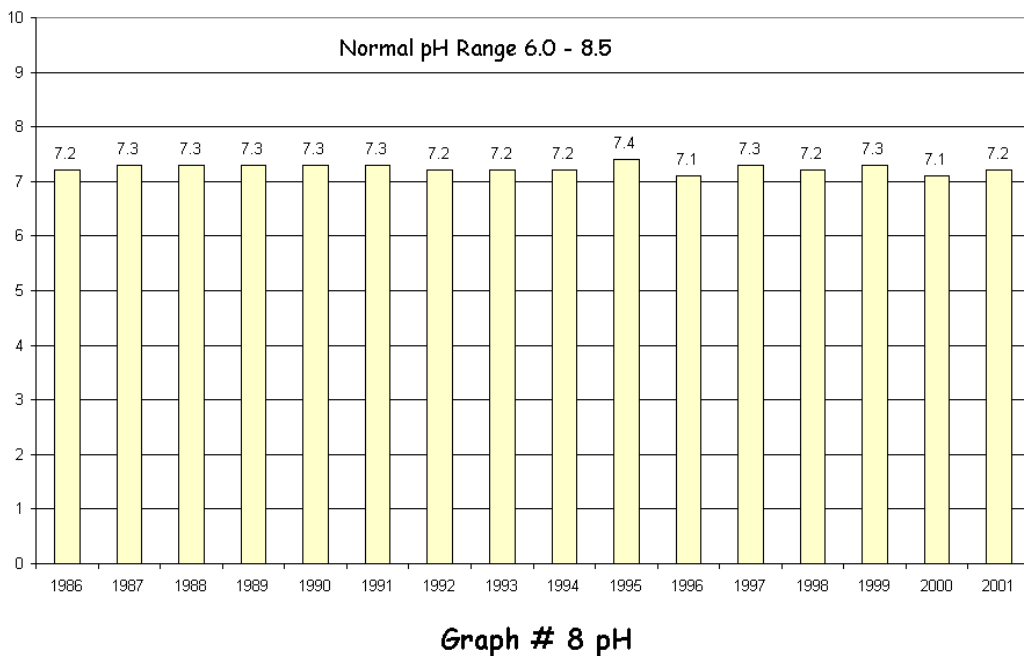
Criteria: *Nitrate Nitrogen is usually the most prevalent form of nitrogen in water because it is the end product of the aerobic decomposition of organic nitrogen. Nitrate from natural sources is attributed to the oxidation of nitrogen in the air by bacteria and to the decomposition of organic material in the soil. Fertilizers may add nitrate directly to water resources. Nitrate concentrations can range from a few tenths to several hundred milligrams per liter. In nonpolluted water, they seldom exceed 10 mg/l. Nitrate is a major component of human and animal wastes, and abnormally high concentrations suggest pollution from these sources.*



The samples for nitrate nitrogen ranged from a low reading of 0.01 mg/l to a high of 6.1 mg/l. The overall nitrate nitrogen Geometric Mean was 0.6 mg/l. This is well below the maximum limit of 10 mg/l (Graph # 7). No samples were above the maximum contaminate level of 10 mg/l. Stations 25-04 in the Old Mill Branch Watershed and 06-02 in Bullneck Run had the highest geometric mean of all samples collected in 2001 as indicated in Table 6. Station 25-04 ranged from the high of 6.1 mg/l in February to a low of 0.1 in October.

IV. PH

Criteria: *Stream pH is an important factor in aquatic systems. Biological productivity, stream diversity, metal solubility, and toxicity of certain chemicals, as well as important chemical and biological activity, are strongly related to pH. The pH range of 6.0 - 8.5 generally provides adequate protection for aquatic life and for recreational use of streams.*

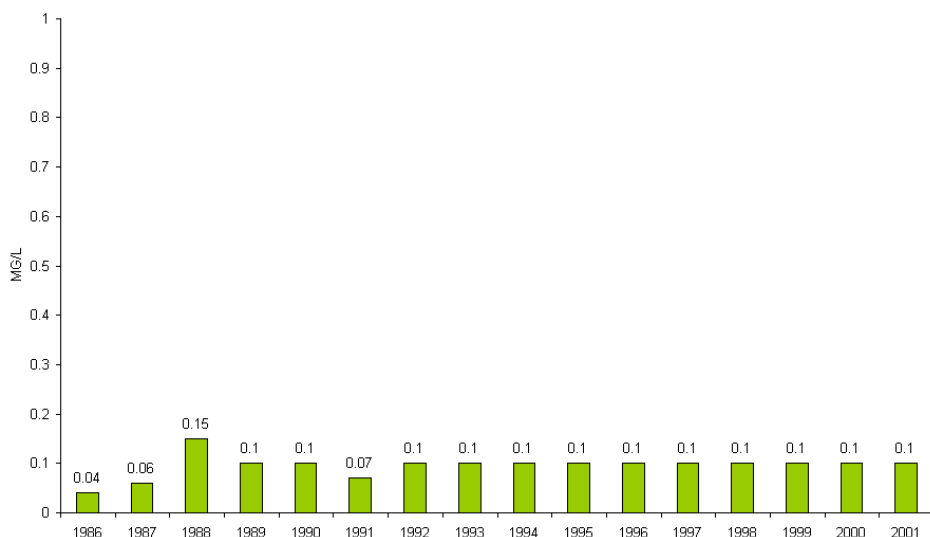


The average pH for all samples was 7.2 in 2001. The pH values ranged from a low reading of 5.2 to a high of 9.3 for all samples. Fifteen samples were above the 8.5 limit and six samples were below the 6.0 limit. Follow up testing indicated normal pH in sites that tested above and below pH range limits.

V. Phosphorous (Total)

Criteria: *Phosphorous is found in natural water in the form of various types of phosphates. Organic phosphates are formed in the natural biological processes. Therefore, they are contributed to sewage in body wastes and food residues. They may also be formed in the biological treatment process or by life existing in the receiving water.*

Condensed phosphates and orthophosphates are found in treated wastewater, laundry detergents, commercial cleansing compounds and fertilizers. Phosphorous is essential to the growth of organisms and can be the nutrient that limits the growth which a body of water can support. When phosphorous is a growth limiting nutrient, the discharge of raw or treated sewage, agricultural drainage or certain industrial wastes to receiving water may stimulate the growth, in nuisance quantities, of photosynthetic aquatic microorganisms and macroorganisms.



Graph # 9 TOTAL PHOSPHOROUS

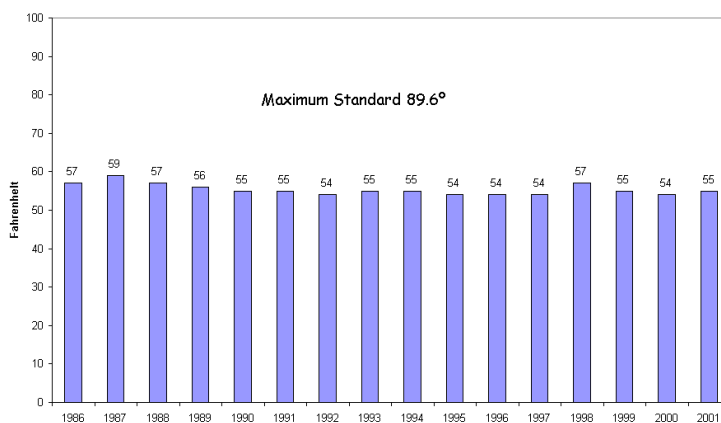
There is no established limit for total phosphorous content in stream water. Variations of the phosphorous content may help determine possible trends of water contamination. Significant increases in total phosphorous may indicate increasing amounts of contaminants entering the stream. This year's Geometric Mean of 0.10 mg/l does not indicate a significant increase over prior years' averages. Beginning in 1993, averages were a minimum of 0.10 mg/l due to a change in the Health Department Laboratory's testing

procedure for total phosphorous. The new automated testing procedure uses 0.10 mg/l as the lowest detection level rather than the 0.02 mg/l limit used prior to 1992. Phosphorous results for the past 16 years are illustrated in Graph # 9.

VI. Temperature

Criteria: *The existence and composition of an aquatic community also depends greatly on the temperature characteristics of a body of water. Thus, temperature limits are included in water quality standards to protect and maintain a balanced aquatic community. The maximum standard for free flowing streams is 89.6°F (32°C).*

The temperature range for all stream water samples collected in 2001 was 32°F for the low in January and 84°F for the high in August. The average for all samples collected in 2001 was 55°F (Graph # 10).



Graph #10 WATER SAMPLE TEMPERATURE

VII. Heavy Metals

Criteria: *The presence of heavy metals in stream water indicates possible discharge of household and industrial waste into the stream. Sampling establishes baseline data for identifying point source pollution from areas where urbanization of the stream area is or will be occurring.*

The following metals have been selected for sampling based on their occurrence in industrial and household waste discharge, their potential health hazards, and as part of the Virginia Department of Environmental Quality-Water requirements for Surface Water Standards for Surface Public Water Supplies (VR680-21-02.3).

Ten years (1989 -1998) of results are available in **Table 13** ([page 36-42](#)). All results are within normal limits.

KEY FOR METAL TESTING RESULTS

CONTAMINANT	PMCL : DETECTION LIMITS (MG/L)	SOURCE*	POTENTIAL HEALTH HAZARD*
ARSENIC	0.05 MG/L : 0.001 MG/L	Industrial / Household	Carcinogenic
BARIUM	1.00 MG/L : 0.03 MG/L	Industrial	Circulatory
CADMIUM	0.05 MG/L : 0.001 MG/L	Industrial Deterioration of Galvanized Pipe	Urinary
CHROMIUM	0.05 MG/L : 0.001 MG/L	Industrial	Arteriosclerosis
LEAD	0.05 MG/L : 0.002 MG/L	Industrial	Neurological
MERCURY	0.02 MG/L : 0.0002 MG/L	Industrial	Neurological
SELENIUM	0.01 MG/L : 0.003 MG/L	Industrial	Gastrointestinal
SILVER	0.05 MG/L : 0.001 MG/L	Industrial	Argyria
*Environmental Engineering & Sanitation 3rd Ed. by Joseph A. Salvato and Standard Methods for Examination of Water and Wastewater 16th Edition.			

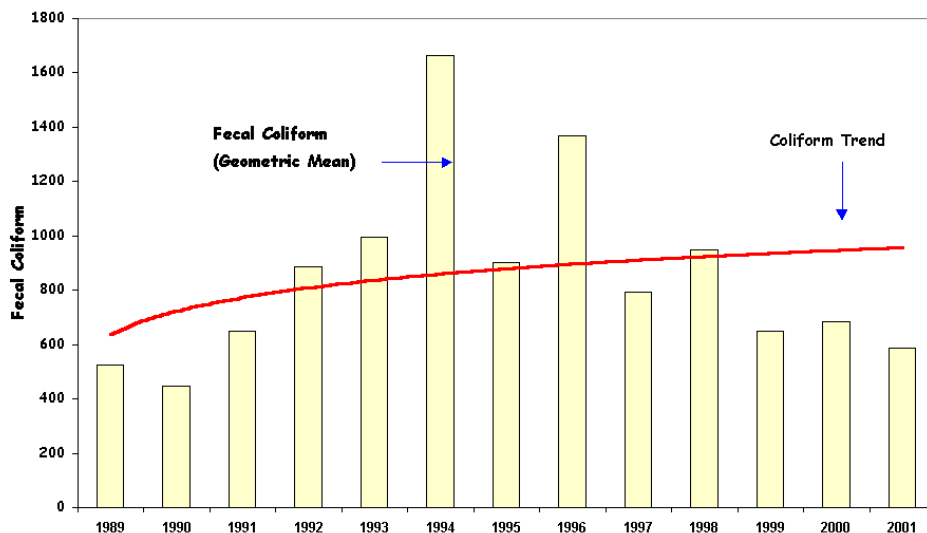
VIII. Lake Accotink

Background: *Lake Accotink is sampled from four surface points on the lake from May through August. The four sample points are surface grab samples and are only accessible by boat. It is necessary to coordinate the sampling schedule with the availability of a boat and operator, which is provided by the Fairfax Park Authority.*

Five samples were collected from Lake Accotink in 2001. Results from the sampling were unremarkable and are summarized in [Table 11](#).

IX. Fairfax City Stream Sites (Accotink Watershed)

Background: Stream sites are within a highly urbanized area and are subject to run-off from shopping centers, garages, parking lots, and other potentially high pollution areas. Storm drains feed the majority of the streams passing through the city and have been implicated, since sampling of the streams began in 1988, as sources of pollution from improperly disposed petroleum products. The streams within this area are part of the headwaters for the Accotink Watershed. Results of all samples collected for testing are located in [TABLE 12](#).

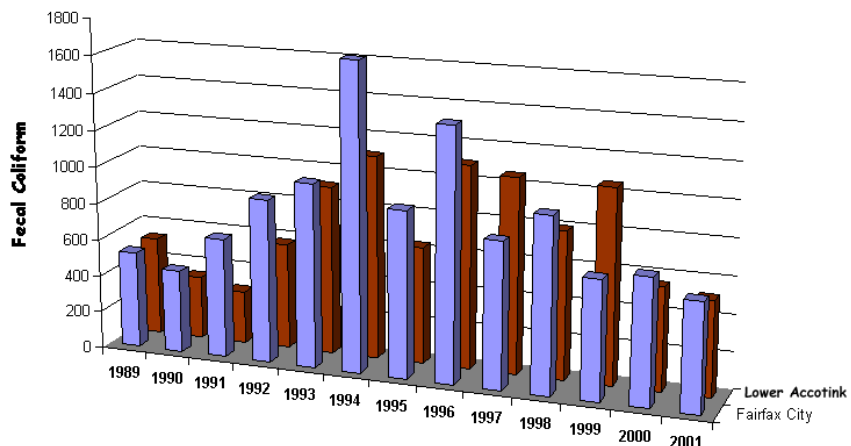


GRAPH # 11 Fairfax City - Fecal Coliform

Eighty-two percent (82%) of the samples collected for fecal coliforms had results greater than or equal to 200 fecal coliforms/100 ml, while 18% of the samples collected are less than 200 fecal coliforms. The Geometric Mean for fecal coliforms from all Fairfax City stream sites decreased slightly over 2000 average of 686 fc/100ml to 588 fc/100 ml in 2001 (Graph #11).

The Fairfax City sample sites show the same general trend for fecal coliform as the other Accotink sampling sites. The samples for 2001 have a higher geometric mean than the lower Accotink sampling sites found outside of the Fairfax City limits (Graph #12).

The pH ranged from a low of 5.8 to a high of 8.2 in the 2001 sampling year. The Mean for pH for all city sites is 7.1 for 2001. Total phosphorous levels ranged from a low of 0.1 mg/l to a high of 0.2 mg/l. Nitrate nitrogen ranged from a low of 0.10 mg/l to a high of 3.4 mg/l. The overall nitrate nitrogen average for all stream sites within Fairfax City is 0.53 mg/l. The dissolved oxygen results ranged between 2.3 mg/l for the low to 14.8



GRAPH #12 Fairfax City Vs Accotink Watershed

mg/l for the high, with one sample results less than 4 mg/l. The Dissolved Oxygen Geometric Mean for all sites in 2001 was 8.6 mg/l.

X. Water Quality Summary Statement

The 2001 Stream Water Quality Report includes data collected from 84 sampling sites from 25 of the 30 watersheds in Fairfax County. A total of 1,656 stream samples were collected for analyses in 2001. These sampling sites are representative of all the streams monitored within these watersheds. The data in this report shows fluctuations in the stream water quality for individual sampling sites. The average geometric mean for fecal coliform at several of the stream sample sites is approaching and surpasses 1000 f.c./100ml (see table 4). The chemical and physical parameters have remained constant over the past five years (see tables 7 -10). Therefore, the overall water quality of the watersheds in Fairfax County is considered fair for fecal coliform and good for the chemical and physical parameters of the streams.

In summary, any open, unprotected body of water is subject to pollution from indiscriminate dumping of litter and waste products, sewer line breaks and contamination from runoff pesticides, herbicides, and waste from domestic and wildlife animals. Therefore, the use of streams for contact recreational purposes, such as swimming, wading, etc., which could cause ingestion of stream water or possible contamination of an open wound by stream water, should be avoided.

SECTION 2 2001 WATER QUALITY PROGRAMS

I. Adopt-A-Stream Program

Background: *The program was introduced at the Fairfax Fair in June 1989 in response to the Environmental Quality Advisory Council (EQAC) recommendations to promote citizen awareness to the potential hazards of recreational usage of streams and to provide the Health Department with citizen surveillance in the field of reporting possible pollution problems. An estimated 2000 people were provided information about the program through the display at the fair. Since 1989, the program has generated considerable interest in the private sector and citizens are responding on a regular basis. The program received national recognition when it was awarded the National Association of Counties 1991 Achievement Award and the Virginia Municipal League's 1991 award for Environmental Quality. A paper on the objectives and goals of the program was presented to the Virginia Water Resources Conference April 1992. Participants in the program range from individuals to Scout groups, civic organizations, public and private school science classes. Due to budget adjustments and staff reduction the program has been inactive for the past two years.*

2001 HIGHLIGHTS:

- The Annual Stream Report is being utilized in the County's Stream Protection Strategy.

- A two-year study with the United States Geological Survey (USGS) was initiated in 2000 to determine a method to "type" the fecal coliform found in streams. Results from this report were used as part of the USGS model.
- Ninety-five individuals and groups have participated in the program. These members represented over five hundred people involved in stream awareness and individual programs. The program has been inactive for the past two years due to staff reductions and increased workload of the Division of Environmental Health. Staff answers stream questions when requested by phone or mail.
- Environmental Health Specialists have presented One hundred (100) stream awareness programs to 1,938 county residents since the program began in 1989.
- The Fairfax County, Department of Public Works, Utilities Planning and Design Division has incorporated the Adopt-A-Stream program and the Annual Stream Water Quality Report into Part I of their National Pollutant Discharge Elimination System Permit Application (NPDES).
- The Department of Public Works identifies both the Stream Water Quality Report and the Adopt-A-Stream program as programs used by the County to help identify potential pollution sources.

II. Stream Complaints

Background: *Procedures for investigation of stream complaints were standardized in 1989 to allow staff to respond in a minimum amount of time to potential point source pollution. The program was developed with the Adopt-A-Stream program as a central contact point for citizens to report stream problems. Since 1989 several of the complaints have resulted in court action, identification of underground spills and quicker departmental response to reported pollution problems.*

Twenty seven (27) site visits were made to investigate 12 complaints in 2001. The 12 complaints were initially investigated by Health Department staff and referred to the proper agency or resolved utilizing Health Department procedures and local ordinances. Two complaints dealt with possible sewer line breaks, 1 was associated with dumping in the streams, 6 were related to color or odor problems, 2 dealt with runoff problems and 1 related to a broken water main in the stream bed.

Section 3

Appendix A-Laboratory Procedures:

All laboratory procedures used in this report are defined in "Standard Methods for the Analysis of Water and Wastewater, 19th Edition", 1995. The fecal coliform procedure utilizes the Millipore filter and gives a direct count per 100 ml of sample. The nitrate nitrogen is determined by the automated cadmium reduction method and phosphates are determined by persulfate digestion followed by the ascorbic acid colorimetry. Heavy metal determination is made by electrothermal atomic absorption method using a graphite furnace. Mercury was analyzed by Cold Vapor Technique. Detection limits for heavy metals are located in a table found in Section I -VII of this report.

Beginning in 2000, a portable Hydrolab probe was utilized to collect the Dissolved Oxygen, pH and record the temperature of the samples taken in the field. The Hydrolab probe is standardized before each sampling event and the results recorded in a log before each use. The log is the quality assurance for the use of the probe and the results of the standardization is monitored for accuracy between use.

Appendix B-Watersheds and Sampling Sites

There are 30 watersheds within the County encompassing approximately 400 square miles. Sampling sites are established on 25 of these watersheds. Five watersheds are small and do not contain any well-defined streams; therefore, these are excluded from the program.

Sampling stations are located on the major streams and their main tributaries. The sample station identification number is a two-part number identifying the watershed and the sample site. There are gaps in the sequential numbering system due to additions and elimination's of sample sites over several years.

The number of sampling sites in 2000 increased to 85. Eight sites within the Accotink Creek watershed were added in 1988 at the request of Fairfax City and 13 sites were added in 2000 for a total of 85. The Mill Branch sampling station (20-03) was dropped from the sampling schedule in 2001. The amount of available water to sample was determined to be insufficient for proper evaluation. The sampling site is located downstream from a debris landfill and is monitored by the Commonwealth of Virginia's Department of Environmental Quality- Waste.

The reports for the Accotink Creek watershed include the stream sample results from the Fairfax City sites as well as the Accotink Creek sites in the County. Samples are collected twice a month using a combination of random grab samples and a portable probe.

The stream sample site locations have been evaluated for run-off potential and possible sources of pollution. The sites are located on tax maps and diagrams of the sites are available for reference.

Directions to the sites were developed to standardize the sampling sites and for use in the field by Environmental Health Specialists.

Maps of sampling sites were developed using Fairfax County's Geographic Information System (GIS). The maps are part of Section 5 of this report and new for this year are maps for all watersheds with sampling sites. Health Department personnel using a GPS system and the County's ArcView program generated these maps.

Appendix C-Data Tables and Calculations

Comparison and trends of the data are based on a five, ten and fifteen year periods. Data may be obtained for previous years from earlier reports. Data for years prior to 1973 are not comparable due to differentiation in laboratory methods and reporting techniques. The terms Geometric Mean and Average are defined as follows:

The geometric mean is defined as the antilog of the average of the logarithms of the data values. The term average is used as the Arithmetical Average of data values.

Fecal coliform results for each station are presented in [Table 2](#). The data provides for a year comparison of sample stations to assist in recognizing trends in water quality. The percentage of samples based on their fecal coliform classification (<200 F.C./100 ml and equal to or >200 F.C./100 ml) for each of the watersheds is shown with comparison to previous years in [Table 3](#). [Table 4](#) gives the geometric mean value for each sampling station for fecal coliform organisms. The annual data for dissolved oxygen is presented in [Table 5](#). The data for nitrate nitrogen, pH, and total phosphorous is provided in [Table 6](#). [Tables 7](#) (nitrate nitrogen), [8](#) (pH) and [9](#) (total phosphorous) compare a five-year period for each watershed. The average temperature, with the high and low temperature for each month, is found in [Table 10](#). The Lake Accotink Data is presented in [Table 11](#). A separate report for the Fairfax City stream sites is included in [Table 12](#) and the sampling data for heavy metal screening is included in [Table 13](#).

The calculations for this report are generated using dBase IV programming to provide the database and mathematical computations. Development of the computer database began in 1986 with the data stored by calendar year (January 1 to December 31) for report generation. Graphs were generated using Microsoft Office 97, Excel.

The Fairfax County Stream Sampling Sites maps were created as a GIS project using ArcView for Windows. As physical overlays of the County are developed, the GIS program will be developing more detailed maps of sampling sites.

Appendix D-Stream Water Quality Report Background

The Department of Health's Division of Environmental Health in the fall of 1969 initiated the Stream Water Quality Program. The primary objective of the program is to monitor the water quality of the streams in Fairfax County and obtain data for use in stream water quality surveillance. This enables the Environmental Services staff to locate pollution sources and to initiate corrective action or refer to the appropriate agency for corrective action. The data for this report was collected by the staff of the

Environmental Services Section with supplemental information from the Environmental Monitoring Section “**2001 Annual Summary Report**” for the Fairfax County Board of Supervisors.

The parameters originally selected as criteria for stream water quality were fecal coliform and dissolved oxygen. The parameters were expanded in 1979 to include pH, nitrate nitrogen and total phosphorous and in 1982, to include temperature criteria. A screening for heavy metals was collected from 1989 to 1998 to establish a background database for future evaluations. The criteria of each parameter used in this report are based on the Department of Environmental Quality-Water (DEQW) standards.

The 1994 report contained several enhancements to the programming and presentation formats. The format for Tables 1,3,4,10 and 11 was changed for better understanding and readability. All tables are now generated by dBase IV programming and do not require time to enter additional information for five-year comparison reports. The graphs are embedded files in the report, resulting in sharper graphic images.

The 1995 and 1996 reports contain enhancements using Fairfax County's GIS Pilot program and downloaded information and material from the Internet. Future enhancements will include a menu of utility programs for monthly, quarterly or semiannual review of statistics.

Annual Stream reports from 1997 to the present are available for downloading from the Health Department's web site (<http://www.fairfaxcounty.gov/service/strannualrpt.htm>). The reports are available in Acrobat PDF file format and the chemical and fecal coliform results from 1986 to the present are available in dBase IV format.

In 2000, thirteen (13) additional sampling sites were added to the survey and GIS maps for each watershed with sampling sites were made for inclusion in the Annual Report. The GIS overlay for the location of the stream sampling sites were created in house using Health Department GPS equipment.

We welcome comments, suggestions and clarifications. However, the **Stream Water Quality Report** is a **trend** analysis report and general findings should not be applied to specific sampling sites. Samples are grab samples collected twice a month, when possible, with many factors influencing any particular sample. Results should be viewed in perspective to all sampling sites within the watershed as well as all sampling sites within the county.

The **Stream Water Quality Report** is provided to the Fairfax County Board of Supervisors, the Metropolitan Washington Council of Governments, Northern Virginia Soil and Water Conservation District, Northern Virginia Planning District Commission, Fairfax County Park Authority, Fairfax City Office of City Planning, Prince William Water and Conservation Division and any Fairfax County citizens group or individual requesting the report. Request for additional copies of the **Stream Water Quality Report** may be directed to the mailing address found in the Table of Contents.

SECTION - 4

DATA TABLES

TABLE 1
Number of stream visits made
for collection of stream samples
by Year

	1997	1998	1999	2000	2001
Number of samples collected for Fecal Coliforms	1686	1520	1486	1277	1656
Number of samples collected for Dissolved Oxygen	1686	1520	1486	1277	1656
Number of samples collected for Total Phosphorous	1686	1520	1486	1277	1656
Number of Samples collected for pH	1686	1520	1486	1277	1656
Number of samples collected for Nitrate Nitrogen	1686	1520	1486	1277	1656

NUMBER OF SAMPLES COLLECTED
BY TYPE OF SAMPLE
FOR 2001

FECAL COLIFORM	1656
DISSOLVED OXYGEN	1639
NITRATE NITROGEN	1526
TOTAL PHOSPHOROUS	1526
PH	1639

**TABLE 2
NUMBER OF FECAL COLIFORM SAMPLES
FOR EACH SAMPLING SITE**

REPORT FROM		01/01/2001	TO	12/31/2001
SAMPLE STATION	TOTAL SAMPLES COLLECTED	<200 /100 ml	200-1000 /100 ml	>1000 /100 ml
HORSEPEN CREEK				
01-01	20	2	16	2
SUGARLAND RUN				
02-02	21	4	9	8
02-03	22	4	13	5
NICHOL RUN				
03-03	17	3	10	4
POND BRANCH				
04-01	22	3	14	5
04-02	22	7	8	7
04-03	22	3	13	6
DIFFICULT RUN				
05-01	23	1	13	9
05-05	19	4	10	5
05-09	19	2	11	6
05-11	19	2	13	4
05-12	19	3	11	5
05-13	19	4	8	7
05-15	21	4	8	9
05-1b	21	5	12	4
05-18	19	2	11	6
05-19	20	0	14	6
BULLNECK RUN				
06-02	19	3	12	4
SCOTTS RUN				
07-01	19	2	9	8
DEAD RUN				
08-02	19	2	13	4
TURKEY RUN				
09-01	19	2	10	7

TABLE 2
NUMBER OF FECAL COLIFORM SAMPLES
FOR EACH SAMPLING SITE

REPORT FROM		01/01/2001	T0	12/31/2001
SAMPLE STATION	TOTAL SAMPLES COLLECTED	<200 /100 ml	200-1000 /100 ml	>1000 /100 ml
PIMMIT RUN				
10-02	19	1	14	4
10-03	19	3	11	5
10-04	20	3	13	4
10-05	19	1	13	5
FOUR MILE RUN				
11-03	22	3	10	9
CAMERON RUN				
12-04	22	8	11	3
12-05	23	4	14	5
12-07	22	6	7	9
12-12	19	3	12	4
12-13	19	2	10	7
12-14	20	2	15	3
LITTLE HUNTING CREEK				
14-02	19	3	8	8
14-03	19	3	9	7
DOGUE CREEK				
15-06	19	2	10	7
ACCOTINK CREEK				
16-03	22	4	13	5
16-07	22	3	12	7
16-08	22	4	11	7
16-09	22	3	14	5
16-12	18	5	10	3
POHICK CREEK				
17-04	19	2	13	4
17-05	20	5	7	8
17-06	19	5	9	5
17-08	19	3	12	4
17-13	21	4	13	4

TABLE 2
NUMBER OF FECAL COLIFORM SAMPLES
FOR EACH SAMPLING SITE

REPORT FROM:		01/01/2001	TO	12/31/2001
SAMPLE STATION	TOTAL SAMPLES COLLECTED	<200 /100 ml	200-1000 /100 ml	>1000 /100 ml
MILL BRANCH				
20-01	19	3	12	4
20-02	19	5	9	5
SANDY RUN				
22-03	19	2	10	7
22-04	19	4	7	8
WOLF RUN				
24-01	21	5	14	2
24-02	21	3	13	5
OLD MILL BRANCH				
25-04	21	3	10	8
POPES HEAD CREEK				
26-02	20	4	13	3
26-03	21	2	12	7
26-05	21	3	12	6
JOHNNY MOORE CREEK				
27-01	21	4	9	8
LITTLE ROCKY RUN				
28-01	22	4	11	7
28-02	21	3	14	4
CUB RUN				
29-02	22	1	14	7
29-03	22	1	15	6
29-04	22	3	9	10
29-05	22	0	14	8
29-06	22	3	12	7
29-08	22	2	9	11
BULL RUN				
30-01	22	3	11	8
LAKE ACCOTINK				
LA-01	5	0	3	2
LA-02	5	0	3	2
LA-03	5	0	3	2
LA-04	3	0	1	2

TABLE 3

**Five Year Comparison of Stream Water Quality Data
by Percentage of Samples in the Good Range For Fecal Coliforms
(Less than 200 f.c. per 100 mg/1)**

WATERSHED	Five Year Survey From					To		2001
						YEAR		
	1997	1998	1999	2000	2001			
HORSEPEN CREEK-01	13	6	5	11	15			
SUGARLAND RUN-02	14	12	14	13	17			
NICHOL RUN-03	23	8	0	14	13			
POND BRANCH-04	24	13	10	14	20			
DIFFICULT RUN-05	15	9	6	16	14			
BULLNECK RUN-06	21	8	24	25	16			
SCOTTS RUN-07	30	4	14	13	11			
DEAD RUN-08	4	4	5	6	11			
TURKEY RUN-09	35	8	29	25	11			
PIMMIT RUN-10	8	3	10	11	10			
FOUR MILE RUN-11	13	4	5	5	14			
CAMERON RUN-12	22	5	15	12	21			
LITTLE HUNTING-14	10	5	17	19	16			
DOGUE CREEK-15	13	18	5	13	11			
ACCOTINK CREEK-16	13	7	13	10	18			
POHICK CREEK-17	21	7	12	13	19			
MILL BRANCH-20	21	4	30	6	21			
SANDY RUN-22	27	7	19	4	16			
WOLF RUN-24	24	10	13	9	19			
OLD MILL-25	35	11	17	17	14			
POPES HEAD-26	26	13	13	13	14			
JOHNNY MOORE-27	13	21	16	13	19			
LITTLE ROCKY-28	17	17	8	23	16			
CUB RUN-29	19	15	13	26	10			
BULL RUN-30	29	30	9	35	14			

Table 4
Geometric Mean of Fecal Coliforms
Per 100/ml by Supervisor Districts

Five Year Survey			From	1997	To	2001			
District/ Station Number	Stream Name	Collection point	Year Collected						
			1997	1998	1999	2000	2001		
BRADDOCK									
16-07	Long Branch	Braddock Rd	811	695	1472	657	688		
16-08	Accotink Ck	Braddock Rd	962	1006	991	604	556		
DRANESVILLE									
02-02	Folly Lick Br	Hiddenbrook	861	665	642	547	565		
02-03	Sugarland Run	Rt 7	949	804	545	478	485		
03-03	Jefferson Br	Springvale Rd	522	629	725	814	530		
04-01	Mine Run Br	River Bend Rd	560	478	833	545	544		
04-02	Clarks Branch	Beach Mill Rd	511	662	562	541	458		
04-03	Pond Branch	Blackberry La	665	501	580	469	544		
05-15	Capt Hickory Br	Fringe Tree Rd	812	563	808	500	518		
05-19	Wolf Trap Run	Trap Rd	766	795	1032	524	755		
06-02	Bull Neck Run	Georgetown Pk	470	487	616	491	543		
07-01	Scott Run	Georgetown Pk	742	605	807	512	696		
08-02	Dead Run	Whann St	1299	949	1146	664	641		
09-01	Turkey Run	George Wash Pk	444	529	491	491	562		
10-02	Pimmit Run	Old Dominion	1809	741	817	515	682		
10-03	Pimmit Run	Kirby Rd	1106	826	1295	786	547		
10-04	Little Pimmit	Kirby Rd	996	835	739	603	516		
10-05	Pimmit Run	Westmoreland	1792	768	730	364	612		
HUNTER MILL									
01-01	Horsepen Run	Centreville Rd	825	584	939	432	512		
05-09	Difficult Run	Hunter Mill Rd	684	821	935	486	558		
05-11	Wolf Trap Run	Browns Mill Rd	2236	725	779	459	488		
05-12	Difficult Run	Browns Mill Rd	1269	871	1433	498	558		
05-13	Colvin Mill Run	Rt 7	495	733	914	629	535		
05-18	Wolf Trap Cr	Bois Ave	977	639	1400	657	615		
LEE									
12-14	Pikes Branch	Telegraph Rd	1059	552	742	413	441		
16-09	Accotink Ck	Old Keen Mill	1337	677	941	640	471		
MASON									
11-03	Long Branch	Glen Carlyn Rd	1380	846	1605	606	699		
12-04	Tripps Run	Sleepy Hollow	919	790	918	584	368		
12-05	Holmes Run	Sleepy Hollow	689	930	998	730	463		
12-07	Holmes Run	Glen Hills Pk	692	661	790	565	549		
12-12	Turkey Cock	Edsall Rd	782	496	623	419	502		
MT VERNON									
12-13	Cameron Run	Fenwick Drive	950	671	784	660	611		
14-02	Lit Hunting Ck	Richmond Hwy	1121	939	724	426	645		

Table 4
Geometric Mean of Fecal Coliforms
Per 100/ml by Supervisor Districts

Five Year Survey			From	1997	To	2001		
District/ Station Number	Stream Name	Collection point	Year Collected					
			1997	1998	1999	2000	2001	
MT VERNON								
14-03	Lit Hunting Ck	Richmond Hwy	1568	877	944	574	672	
16-12	Long Branch	Backlick Rd	1243	702	905	332	390	
17-06	Pohick Creek	Pohick Rd	588	702	529	590	482	
17-08	Pohick Creek	Old Colchester	854	582	897	629	494	
20-01	Giles Run	Lorton Rd	1226	805	687	648	522	
20-02	Giles Run	Old Colchester	884	755	440	657	426	
20-03	South Branch	Old Colchester	334	448	392	1039	900	
PROVIDENCE								
16-03	Accotink Creek	Barclay Dr	1042	990	1055	593	499	
SPRINGFIELD								
17-04	Pohick Creek	Old Keene Mill	917	601	853	498	618	
17-05	South Run	Lee Chapel Rd	684	484	763	670	491	
17-13	Pohick Creek	Burke Lake Rd	1493	926	1325	410	510	
22-03	Sandy Run	Henderson Rd	861	861	735	551	725	
22-04	Sandy Run	Cathedral Forest	744	702	690	718	631	
24-01	Wolf Run	Clifton Rd	661	566	579	775	354	
24-02	Wolf Run	Henderson Rd	795	602	586	520	509	
25-04	Bull Run	Old Yates Ford	531	565	591	560	777	
26-02	Popes Head Ck	Popes Head Rd	688	562	600	532	451	
26-03	Piney Branch	Popes Head Rd	370	554	534	530	695	
26-05	Popes Head Ck	Clifton Creek	840	699	919	625	706	
27-01	Johnny Moore Ck	Compton Rd	831	514	507	551	582	
28-02	Little Rocky Run	Compton Rd	773	631	832	545	536	
SULLY								
05-01	Difficult Run	Waples Mill & Fox Mill rd	555	464	981	472	745	
05-05	Difficult Run	Vale Rd	993	766	1111	594	478	
28-01	Little Rocky Run	Lee Hwy	1130	506	869	328	695	
29-02	Big Rocky Run	Braddock Rd	754	511	421	348	660	
29-03	Cub Run	Braddock Rd	760	626	646	528	679	
29-04	Cub Run	Compton Rd	662	484	458	349	695	
29-05	Flatlick Branch	Lee Jackson Rd	840	981	670	372	699	
29-06	Flatlick Branch	Braddock Rd	641	577	692	374	628	
29-08	Cub Run	Braddock Rd	527	500	446	390	679	
30-01	Bull Run	Lee Hwy	527	419	698	339	676	

TABLE 5
DISSOLVED OXYGEN
mg/l

REPORT FROM: 01/01/2001 TO: 12/31/2001

SAMPLE STATION	TOTAL SAMPLES COLLECTED	AVERAGE DISSOLVED OXYGEN	PERCENTAGE OF SAMPLES LESS THAN 4.0 mg/l
HORSEPEN CREEK			
01-01	17	9.9	0
SUGARLAND RUN			
02-02	22	9.6	0
02-03	22	10.3	0
NICHOL RUN			
03-03	18	9.7	0
POND BRANCH			
04-01	22	9.6	0
04-02	22	9.2	0
04-03	21	9.8	0
DIFFICULT RUN			
05-01	22	9.6	0
05-05	17	9.2	0
05-09	17	9.1	0
05-11	17	9.7	0
05-12	17	9.0	0
05-13	17	9.6	0
05-15	21	10.0	0
05-18	17	9.1	0
05-19	17	9.7	0
BULLNECK RUN			
06-02	19	9.9	0
SCOTTS RUN			
07-01	19	10.2	0
DEAD RUN			
08-02	19	9.2	0
TURKEY RUN			
09-01	19	10.5	0

TABLE 5
DISSOLVED OXYGEN
mg/1

REPORT FROM: 01/01/2001

TO: 12/31/2001

SAMPLE STATION	TOTAL SAMPLES COLLECTED	AVERAGE DISSOLVED OXYGEN	PERCENTAGE OF SAMPLES LESS THAN 4.0 mg/1
PIMMIT RUN			
10-02	19	8.8	0.0
10-03	19	9.6	0.0
10-04	19	9.8	0.0
10-05	19	9.6	0.0
FOUR MILE RUN			
11-03	22	10.5	0.0
CAMERON RUN			
12-04	22	9.4	0.0
12-05	22	9.5	0.0
12-07	22	9.9	0.0
12-12	19	9.1	0.0
12-13	19	8.1	0.0
12-14	19	8.7	0.0
LITTLE HUNTING CREEK			
14-02	20	7.2	5.0
14-03	19	7.0	15.8
DOGUE CREEK			
15-06	18	7.5	5.6
ACCOTINK CREEK			
16-03	22	8.0	4.5
16-07	22	9.7	0.0
16-08	22	9.0	0.0
16-09	22	9.0	0.0
16-12	18	9.7	0.0
POHICK CREEK			
17-04	18	10.0	0.0
17-05	18	8.9	0.0
17-06	18	9.7	0.0
17-08	17	8.5	0.0
17-13	22	8.6	0.0

TABLE 5
DISSOLVED OXYGEN
mg/1

REPORT FROM: 01/01/2001 TO: 12/31/2001

SAMPLE STATION	TOTAL SAMPLES COLLECTED	AVERAGE DISSOLVED OXYGEN	PERCENTAGE OF SAMPLES LESS THAN 4.0 mg/1
MILL BRANCH			
20-01	18	9.1	0.0
20-02	18	9.0	0.0
SANDY RUN			
22-03	18	8.6	11.1
22-04	18	9.5	0.0
WOLF RUN			
24-01	22	7.4	18.2
24-02	21	9.2	4.8
OLD MILL BRANCH			
25-04	22	8.8	0.0
POPES HEAD CREEK			
26-02	22	9.3	0.0
26-03	22	10.6	0.0
26-05	22	9.8	0.0
JOHNNY MOORE CREEK			
27-01	22	8.6	0.0
LITTLE ROCKY RUN			
28-01	22	6.2	9.1
28-02	22	9.7	0.0
CUB RUN			
29-02	20	9.1	0.0
29-03	22	8.4	0.0
29-04	22	8.9	0.0
29-05	22	8.0	0.0
29-06	22	8.1	0.0
29-08	22	8.4	0.0
BULL RUN			
30-01	22	8.1	0.0
LAKE ACCOTINK			
LA-01	5	6.3	0.0
LA-02	5	5.4	0.0
LA-03	5	5.8	0.0
LA-04	3	4.9	0.0

TABLE 6
AVERAGES FOR NITRATE NITROGEN (mg/1)
PH VALUES AND TOTAL PHOSPHOROUS (mg/1)

REPORT FROM: 01/01/2001 TO: 12/31/2001

SAMPLE STATION	AVERAGE NITRATE NITROGEN	AVERAGE PH	AVERAGE TOTAL PHOSPHOROUS
HORSEPEN CREEK			
01-01	1.3	7.5	0.1
SUGARLAND RUN			
02-02	1.6	7.5	0.1
02-03	1.0	7.5	0.1
NICHOL RUN			
03-03	0.8	7.2	0.1
POND BRANCH			
04-01	0.8	7.0	0.1
04-02	1.6	7.0	0.1
04-03	1.6	7.1	0.1
DIFFICULT RUN			
05-01	0.8	6.7	0.1
05-05	1.0	6.8	0.1
05-09	1.0	7.0	0.1
05-11	1.4	7.1	0.1
05-12	1.0	7.0	0.1
05-13	1.2	7.2	0.1
05-15	1.8	6.8	0.1
05-18	0.9	7.2	0.1
05-19	1.3	7.2	0.1
BULLNECK RUN			
06-02	2.7	7.0	0.1
SCOTTS RUN			
07-01	1.0	7.1	0.1
DEAD RUN			
08-02	2.1	7.0	0.1
TURKEY RUN			
09-01	1.3	7.6	0.1

TABLE 6
AVERAGES FOR NITRATE NITROGEN (mg/1)
PH VALUES AND TOTAL PHOSPHOROUS (mg/1)

REPORT FROM: 01/01/2001 TO: 12/31/2001

SAMPLE STATION	AVERAGE NITRATE NITROGEN	AVERAGE PH	AVERAGE TOTAL PHOSPHOROUS
PIMMIT RUN			
10-02	1.3	7.3	0.1
10-03	1.3	7.4	0.1
10-04	1.6	7.4	0.1
10-05	1.3	7.4	0.1
FOUR MILE RUN			
11-03	1.0	7.1	0.1
CAMERON RUN			
12-04	1.4	7.2	0.1
12-05	0.6	7.4	0.1
12-07	0.5	7.3	0.1
12-12	0.7	7.1	0.1
12-13	0.4	7.2	0.1
12-14	0.9	7.2	0.1
LITTLE HUNTING CREEK			
14-02	0.9	7.1	0.2
14-03	0.6	6.9	0.1
DOGUE CREEK			
15-06	0.2	7.0	0.1
ACCOTINK CREEK			
16-03	0.7	6.6	0.1
16-07	0.6	7.0	0.2
16-08	0.8	7	0.1
16-09	0.6	7.1	0.1
16-12	0.4	6.8	0.1
POHICK CREEK			
17-04	0.4	7.0	0.1
17-05	0.3	6.6	0.1
17-06	0.5	7.5	0.1
17-08	0.8	7.0	0.1
17-13	0.5	6.5	0.1

TABLE 6
AVERAGES FOR NITRATE NITROGEN (mg/1)
PH VALUES AND TOTAL PHOSPHOROUS (mg/1)

REPORT FROM: 01/01/2001 TO: 12/31/2001

SAMPLE STATION	AVERAGE NITRATE NITROGEN	AVERAGE PH	AVERAGE TOTAL PHOSPHOROUS
<hr/>			
MILL BRANCH			
20-01	0.8	7.1	0.1
20-02	0.6	7.0	0.1
SANDY RUN			
22-03	0.4	6.9	0.1
22-04	0.3	6.9	0.1
WOLF RUN			
24-01	0.2	7.0	0.1
24-02	0.3	7.0	0.1
OLD MILL BRANCH			
25-04	2.5	7.3	0.1
POPES HEAD CREEK			
26-02	1.4	7.5	0.1
26-03	0.8	7.8	0.1
26-05	0.7	7.3	0.1
JOHNNY MOORE CREEK			
27-01	0.6	7.3	0.1
LITTLE ROCKY RUN			
28-01	0.3	7.2	0.1
28-02	0.6	7.6	0.1
CUB RUN			
29-02	0.6	7.5	0.1
29-03	0.6	7.5	0.1
29-04	0.6	7.8	0.1
29-05	1.2	7.0	0.1
29-06	0.8	7.5	0.1
29-08	0.5	7.7	0.1
BULL RUN			
30-01	0.3	7.6	0.1
LAKE ACCOTINK			
LA-01	0.3	7.1	0.1
LA-02	0.3	7.0	0.1
LA-03	0.2	7.0	0.1
LA-04	0.5	7.0	0.1

Table 7
Geometric Mean of Nitrate Nitrogen
by Watershed

Watershed	Five Year Survey From 1997 To 2001				
	Year Collected				
	1997	1998	1999	2000	2001
01-Horsepen Creek	1.6	1.2	1.4	0.8	1.1
02-Sugar land Run	1.2	0.9	1.1	0.6	0.9
03-Nichol Run	0.7	1.0	0.4	0.6	0.8
04-Pond Branch	1.4	1.5	1.4	0.8	1.2
05-Difficult Run	1.2	1.1	0.9	0.7	1.0
06-Bullneck Run	2.1	1.7	2.2	2.0	2.3
07-Scotts Run	1.3	1.1	1.0	0.9	0.7
08-Dead Run	2.1	1.6	1.8	1.5	1.7
09-Turkey Run	1.2	1.1	1.1	1.0	1.2
10-Pimmit Run	1.5	1.2	1.1	1.0	1.1
11-Four Mile Run	1.4	1.3	0.9	1.3	0.8
12-Cameron Run	0.9	0.7	0.8	0.5	0.5
14-Little Hunting Creek	0.7	0.7	0.7	0.4	0.6
15-Douge Creek	0.2	0.2	0.2	0.1	0.2
16-Accotink Creek	0.7	0.5	0.6	0.5	0.5
17-Pohick creek	0.3	0.3	0.3	0.3	0.3
20-Mill Branch	0.5	0.3	0.4	0.7	0.6
22-Sandy Run	0.3	0.2	0.3	0.2	0.2
24-Wolf Run	0.2	0.2	0.2	0.2	0.2
25-old mill Branch	3.0	3.5	3.7	5.4	1.8
26-Popes Head Creek	0.9	0.8	0.7	0.9	0.7
27-Johnny Moore Creek	0.7	0.4	0.5	0.6	0.4
28-Little Rocky Run	0.5	0.3	0.3	0.3	0.3
29-Cub Run	0.6	0.4	0.7	0.6	0.5
30-Bull Run	0.3	0.2	0.3	0.2	0.2

Table 8
Geometric Mean of pH
by Watershed

Five Year Survey From 1997 To 2001
Year Collected

Watershed	1997	1998	1999	2000	2001
01-Horsepen Creek	7.5	7.4	7.3	7.2	7.4
02-Sugarland Run	7.4	7.5	7.5	7.4	7.6
03-Nichol Run	7.2	7.1	7.2	7.1	7.2
04-Pond Branch	7.0	7.1	7.1	6.9	7.0
05-Difficult Run	7.1	7.1	7.1	6.9	7.0
06-Bullneck Run	7.2	7.3	7.3	7.3	7.0
07-Scotts Run	7.5	7.5	7.7	7.7	7.1
08-Dead Run	7.2	7.0	7.2	7.1	7.0
09-Turkey Run	7.7	7.7	7.7	7.6	7.5
10-Pimmit Run	7.5	7.6	7.6	7.7	7.4
11-Four Mile Run	7.2	7.1	7.4	6.8	7.1
12-Cameron Run	7.3	7.2	7.3	7.0	7.2
14-Little Hunting Creek	6.9	6.8	6.9	6.8	7.0
15-Douge Creek	6.8	6.9	6.9	6.8	7.0
16-Accotink Creek	7.2	7.2	7.3	7.0	7.0
17-Pohick Creek	7.1	7.1	7.2	6.9	6.9
20-Mill Branch	7.2	7.2	7.3	7.1	7.0
22-Sandy Run	7.5	7.1	7.2	7.2	6.9
24-Wolf Run	7.5	7.2	7.2	7.0	7.0
25-Old Mill Branch	7.5	7.6	7.5	7.4	7.3
26-Popes Head Creek	7.4	7.4	7.4	7.4	7.5
27-Johnny Moore Creek	7.1	7.3	7.2	7.2	7.3
28-Little Rocky Run	7.4	7.5	7.5	7.4	7.4
29-Cub Run	7.5	7.5	7.6	7.3	7.5
30-Bull Run	7.4	7.3	7.4	7.4	7.6

Table 9
Geometric Mean of Total Phosphorous (mg/l)
by Watershed
Five Year Survey From 1997 To 2001
Year Collected

Watershed	1997	1998	1999	2000	2001
01-Horsepen Creek	0.11	0.11	0.11	0.13	0.10
02-Sugarland Run	0.10	0.11	0.10	0.12	0.10
03-Nichol Run	0.09	0.10	0.10	0.10	0.09
04-Pond Branch	0.10	0.10	0.10	0.11	0.09
05-Difficult Run	0.10	0.10	0.10	0.10	0.09
06-Bullneck Run	0.10	0.10	0.10	0.12	0.09
07-Scotts Run	0.09	0.10	0.10	0.10	0.10
08-Dead Run	0.10	0.10	0.11	0.10	0.10
09-Turkey Run	0.09	0.10	0.10	0.10	0.09
10-Pimmit Run	0.09	0.10	0.10	0.10	0.10
11-Four Mile Run	0.10	0.10	0.10	0.11	0.10
12-Cameron Run	0.10	0.11	0.10	0.10	0.09
14-Little Hunting Ck	0.11	0.12	0.16	0.18	0.13
15-Douge Creek	0.12	0.11	0.11	0.12	0.10
16-Accotink Creek	0.10	0.10	0.10	0.11	0.10
17-Pohick Creek	0.10	0.10	0.11	0.10	0.09
20-Mill Branch	0.13	0.14	0.12	0.11	0.09
22-Sandy Run	0.09	0.10	0.10	0.10	0.09
24-Wolf Run	0.10	0.10	0.10	0.10	0.09
25-Old mill Branch	0.10	0.12	0.10	0.10	0.10
26-Popes Head Creek	0.10	0.10	0.10	0.11	0.09
27-Johnny Moore Ck	0.10	0.11	0.10	0.13	0.10
28-Little Rocky Run	0.10	0.10	0.10	0.10	0.10
29-Cub Run	0.10	0.11	0.10	0.11	0.10
30-Bull Run	0.10	0.10	0.10	0.11	0.09

Table 10
Stream Water Sample Temperature Ranges
(Degrees in Fahrenheit)

Five Year Survey From		1997	To	2001		
		Temperature Averages (Geometric mean)				
		1997	1998	1999	2000	2001
January		39	43	38	37	36
February		45	46	41	42	44
March		48	48	45	51	45
April		54	57	55	56	56
May		59	66	62	65	62
June		66	71	70	68	69
July		72	72	73	71	71
August		72	75	74	71	73
September		66	71	64	63	65
October		58	60	55	54	56
November		45	50	48	46	49
December		40	45	42	36	44
		High & Low Temperature				
		1997	1998	1999	2000	2001
January	High	60	59	59	46	45
	Low	30	34	32	32	32
February	High	62	60	60	59	56
	Low	32	38	34	32	36
March	High	61	72	65	63	55
	Low	42	34	35	35	36
April	High	68	66	68	64	68
	Low	42	49	34	49	45
May	High	74	80	73	77	67
	Low	50	55	48	55	56
June	High	82	81	83	78	83
	Low	56	59	61	59	57
July	High	82	84	83	80	83
	Low	66	64	63	64	62
August	High	80	84	82	80	84
	Low	65	65	62	62	64
September	High	75	83	76	73	77
	Low	58	61	47	59	54
October	High	80	67	64	65	68
	Low	44	51	41	48	45
November	High	60	62	62	56	65
	Low	36	42	38	38	41
December	High	55	60	58	43	56
	Low	35	32	35	32	32

TABLE 11
LAKE ACCOTINK PARK

01/01/2001 TO 12/31/2001

PERCENTAGE OF FECAL COLIFORMS

Station #	Total # Samples	<200 mg/l	200 - 1000 mg/l	>1000 mg/l
LA-01	5	0	60	40
LA-02	4	0	75	25
LA-03	5	0	60	40
LA-04	3	0	33	67

Station #	Average Nitrate Nitrogen	Average pH	Average Total Phosphorous
LA-01	0.3	7.1	0.1
LA-02	0.3	7.0	0.1
LA-03	0.2	7.0	0.1
LA-04	0.5	7.0	0.1

STATION #	Average Dissolved Oxygen	Dissolved Oxygen % Less Than 4 mg/l
LA-01	6.3	0
LA-02	5.5	0
LA-03	5.8	0
LA-04	4.9	0

TABLE 12

**CITY OF FAIRFAX STREAM SAMPLE RESULTS
(ACCOTINK CREEK)
FOR EACH SAMPLING STATION**

REPORT FROM 01/01/2001 TO- 12/31/2001

NUMBER OF FECAL COLIFORM SAMPLES

SAMPLE STATION	TOTAL SAMPLES COLLECTED	<200 per 100ml	200-1000 per 100 ml	>1000 per 100 ml
16-20	20	2	10	8
16-21	20	4	10	6
16-22	20	6	7	7
16-23	20	3	12	5
16-24	19	2	8	9
16-25	19	4	6	9
16-26	20	3	10	7
16-27	21	2	10	9

SAMPLE STATION	TOTAL SAMPLES COLLECTED	AVERAGE DISSOLVED OXYGEN	PERCENTAGE OF SAMPLES LESS THAN 4 mg/l
16-20	22	7.9	4.5
16-21	22	7.8	4.5
16-22	22	9.6	0.0
16-23	22	8.9	0.0
16-24	22	9.4	0.0
16-25	21	9.1	0.0
16-26	22	9.4	0.0
16-27	22	8.8	0.0

SAMPLE STATION COLLECTED	TOTAL SAMPLES	AVERAGE NITRATE NITROGEN	AVERAGE pH	AVERAGE TOTAL PHOSPHOROUS
16-20	22	0.7	7.1	0.1
16-21	22	0.8	7.0	0.1
16-22	22	0.9	7.1	0.1
16-23	22	0.9	7.1	0.1
16-24	22	0.8	7.1	0.1
16-25	21	1.1	7.1	0.1
16-26	22	0.8	7.1	0.1
16-27	22	0.5	7.1	0.1

Table 13
Log Average of Heavy Metals by Watershed
NOTE: PMCL = Primary Maximum Contaminate Level
1989 - 1998

METAL (PMCL)	RESULTS(mg/1)
01- HORSEPEN CREEK:	
Arsenic(0.05mg/1)	0.002
Barium (1.00mg/1)	0.066
Cadmium (0.01mg/1)	0.001
Chromium (0.05mg/1)	0.001
Lead (0.05mg/1)	0.001
Mercury (0.02 mg/1)	Below Detection Limits
Selenium (0.01 mg/1)	0.002
Silver (0.05 mg/1)	0.001
02- SUGARLAND RUN:	
Arsenic (0.05mg/1)	0.001
Barium (1.00mg/1)	0.046
Cadmium (0.01mg/1)	0.001
Chromium (0.05mg/1)	0.001
Lead (0.05mg/1)	0.001
Mercury (0.02 mg/1)	Below Detection Limits
Selenium (0.01 mg/1)	0.002
Silver (0.05 mg/1)	0.001
03- NICHOL RUN:	
Arsenic (0.05mg/1)	0.001
Barium (1.00mg/1)	0.015
Cadmium (0.01mg/1)	0.001
Chromium (0.05mg/1)	0.001
Lead (0.05mg/1)	0.001
Mercury (0.02 mg/1)	Below Detection Limits
Selenium (0.01 mg/1)	0.002
Silver (0.05 mg/1)	0.002
04- POND BRANCH:	
Arsenic (0.05mg/1)	0.001
Barium (1.00mg/1)	0.020
Cadmium (0.01mg/1)	0.001
Chromium (0.05mg/1)	0.001
Lead (0.05mg/1)	0.001
Mercury (0.02 mg/1)	Below Detection Limits
Selenium (0.01 mg/1)	0.002
Silver (0.05 mg/1)	0.001

Table 13
Log Average of Heavy Metals by Watershed
NOTE: PMCL =Primary Maximum Contaminate Level
1989 - 1998

	METAL (PMCL)	RESULTS(mg/1)
05- DIFFICULT RUN:		
	Arsenic (0.05mg/1)	0.001
	Barium (1.00mg/1)	0.021
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.001
	Mercury (0.02mg/1)	Below Detection Limits
	Selenium (0.01 mg/1)	0.002
	Silver (0.05 mg/1)	0.001
06- BULLNECK RUN:		
	Arsenic (0.05 mg/1)	0.001
	Barium (1.00 mg/1)	0.014
	Cadmium (0.01mg/1)	Below Detection Limits
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.001
	Mercury (0.02mg/1)	Below Detection Limits
	Selenium (0.01mg/1)	0.001
	Silver (0.05mg/1)	Below Detection Limits
07- SCOTTS RUN:		
	Arsenic (0.05mg/1)	0.001
	Barium (1.00mg/1)	0.018
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.002
	Mercury (0.02 mg/1)	Below Detection Limits
	Selenium (0.01 mg/1)	0.001
	Silver (0.05 mg/1)	0.001
08- DEAD RUN:		
	Arsenic (0.05mg/1)	0.001
	Barium (1.00mg/1)	0.017
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.002
	Mercury (0.02mg/1)	Below Detection Limits
	Selenium (0.01 mg/1)	0.002
	Silver (0.05 mg/1)	0.001

Table 13
Log Average of Heavy Metals by Watershed
NOTE: PMCL = Primary Maximum Contaminate Level
From 1989 TO 1998

	METAL (PMCL)	RESULTS(mg/1)
09- TURKEY RUN:		
	Arsenic (0.05mg/1)	0.001
	Barium (1.00mg/1)	0.021
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.001
	Mercury (0.02mg/1)	Below Detection Limits
	Selenium (0.01 mg/1)	0.002
	Silver (0.05 mg/1)	0.001
10- PIMMIT RUN:		
	Arsenic (0.05mg/1)	0.001
	Barium (1.00mg/1)	0.023
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.001
	Mercury (0.02 mg/1)	Below Detection Limits
	Selenium (0.01 mg/1)	0.002
	Silver (0.05 mg/1)	0.001
11- FOUR MILE RUN:		
	Arsenic (0.05mg/1)	Below Detection Limits
	Barium (1.00mg/1)	0.020
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.002
	Mercury (0.02mg/1)	Below Detection Limits
	Selenium (0.01mg/1)	0.002
	Silver (0.05mg/1)	0.001
12- CAMERON RUN:		
	Arsenic (0.05mg/1)	0.001
	Barium (1.00mg/1)	0.035
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.002
	Mercury (0.02mg/1)	Below Detection Limits
	Selenium (0.01 mg/1)	0.002
	Silver (0.05mg/1)	0.001

Table 13
Log Average of Heavy Metals by Watershed
From 1989 TO 1998
NOTE: PMCL = Primary Maximum Contaminate Level

METAL (PMCL)	RESULTS (mg/1)
14- LITTLE HUNTING:	
Arsenic (0.05mg/1)	0.001
Barium (1.00mg/1)	0.035
Cadmium (0.01mg/1)	0.001
Chromium (0.05mg/1)	0.001
Lead (0.05mg/1)	0.002
Mercury (0.02mg/1)	Below Detection Limits
Selenium (0.01mg/1)	0.002
Silver (0.05mg/1)	0.001
15- DOGUE CREEK:	
Arsenic (0.05mg/1)	0.002
Barium (1.00mg/1)	0.031
Cadmium (0.01mg/1)	0.001
Chromium (0.05mg/1)	Below Detection Limits
Lead (0.05mg/1)	0.002
Mercury (0.02mg/1)	Below Detection Limits
Selenium (0.01 mg/1)	0.001
Silver (0.05 mg/1)	0.001
16- ACCOTINK CREEK:	
Arsenic (0.05 mg/1)	0.001
Barium (1.00 mg/1)	0.020
Cadmium (0.01mg/1)	0.001
Chromium (0.05mg/1)	0.001
Lead (0.05mg/1)	0.002
Mercury (0.02 mg/1)	Below Detection Limits
Selenium (0.01mg/1)	0.002
Silver (0.05mg/1)	0.001
17- POHICK CREEK:	
Arsenic (0.05mg/1)	0.001
Barium (1.00mg/1)	0.022
Cadmium (0.01mg/1)	0.001
Chromium (0.05mg/1)	0.001
Lead (0.05mg/1)	0.001
Mercury (0.02mg/1)	Below Detection Limits
Selenium (0.01mg/1)	0.002
Silver (0.05mg/1)	0.001

Table 13
Log Average of Heavy Metals by Watershed
From 1989 TO 1998
NOTE: PMCL = Primary Maximum Contaminate Level

	METAL (PMCL)	RESULTS (mg/1)
20- MILL BRANCH:		
	Arsenic (0.05mg/1)	0.001
	Barium (1.00mg/1)	0.043
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.003
	Mercury (0.02 mg/1)	Below Detection Limits
	Selenium (0.01 mg/1)	0.002
	Silver (0.05 mg/1)	0.001
22- SANDY RUN:		
	Arsenic (0.05mg/1)	0.001
	Barium (1.00mg/1)	0.029
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.001
	Mercury (0.02 mg/1)	Below Detection Limits
	Selenium (0.01 mg/1)	0.002
	Silver (0.05 mg/1)	0.001
24- WOLF RUN:		
	Arsenic (0.05mg/1)	Below Detection Limits
	Barium (1.00mg/1)	0.018
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.001
	Mercury (0.02mg/1)	Below Detection Limits
	Selenium (0.01mg/1)	0.002
	Silver (0.05mg/1)	0.001
25- OLD MILL:		
	Arsenic (0.05mg/1)	0.002
	Barium (1.00mg/1)	0.036
	Cadmium (0.01mg/1)	Below Detection Limits
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.002
	Mercury (0.02mg/1)	Below Detection Limits
	Selenium (0.01mg/1)	0.001
	Silver (0.05mg/1)	Below Detection Limits

Table 13
Log Average of Heavy Metals by Watershed
From 1989 TO 1998
NOTE: PMCL = Primary Maximum Contaminate Level

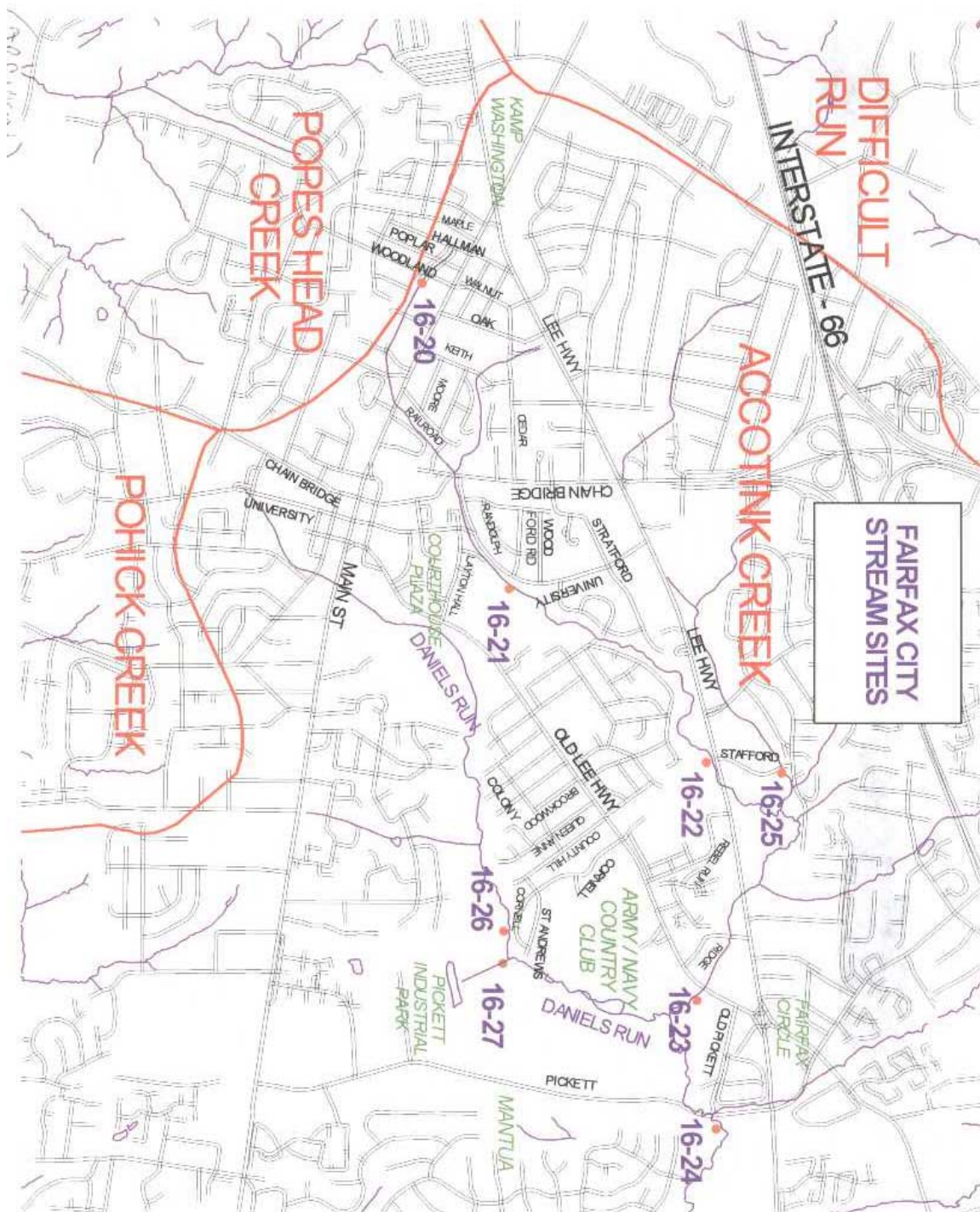
	METAL (PMCL)	RESULTS (mg/1)
26- POPES READ:		
	Arsenic (0.05mg/1)	0.001
	Barium (1.00mg/1)	0.019
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.001
	Mercury (0.02 mg/1)	Below Detection Limits
	Selenium (0.01 mg/1)	0.002
	Silver (0.05 mg/1)	0.001
27- JOHNNY MOORE RUN:		
	Arsenic (0.05 mg/1)	Below Detection Limits
	Barium (1.00 mg/1)	0.017
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.001
	Mercury (0.02mg/1)	Below Detection Limits
	Selenium (0.01mg/1)	0.002
	Silver (0.05mg/1)	0.001
28- LITTLE ROCKY RUN:		
	Arsenic (0.05mg/1)	0.001
	Barium (1.00mg/1)	0.033
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.002
	Mercury (0.02 mg/1)	Below Detection Limits
	Selenium (0.01 mg/1)	0.002
	Silver (0.05 mg/1)	0.001
29- CUB RUN:		
	Arsenic (0.05mg/1)	0.001
	Barium (1.00mg/1)	0.046
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.002
	Mercury (0.02mg/1)	Below Detection Limits
	Selenium (0.01 mg/1)	0.002
	Silver (0.05 mg/1)	0.001

Table 13
Log Average of Heavy Metals by Watershed
From 1989 TO 1998
NOTE: PMCL = Primary Maximum Contaminate Level

	METAL (PMCL)	RESULTS (mg/1)
30- BULL RUN:		
	Arsenic (0.05mg/1)	0.001
	Barium (1.00mg/1)	0.027
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.001
	Mercury (0.02mg/1)	Below Detection Limits
	Selenium (0.01mg/1)	0.002
	Silver (0.05 mg/1)	0.001

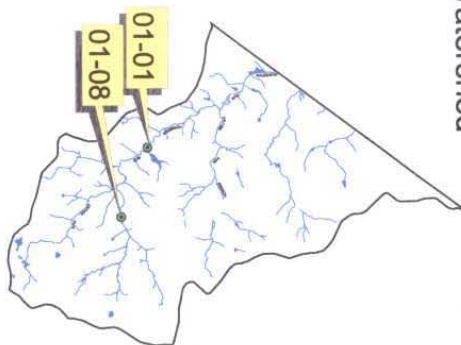
SECTION 5

STREAM SAMPLING SITES

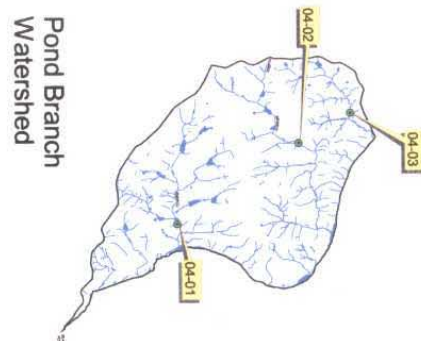
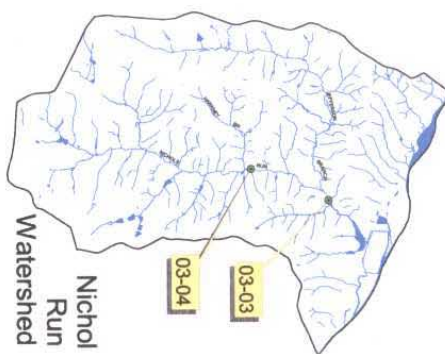
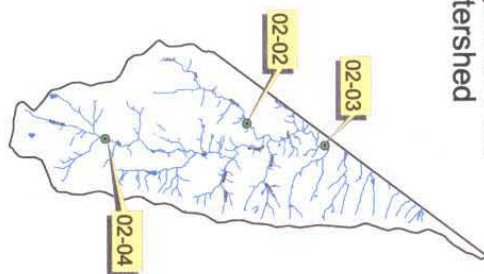


FAIRFAX CITY STREAMS
(Accotink Creek)

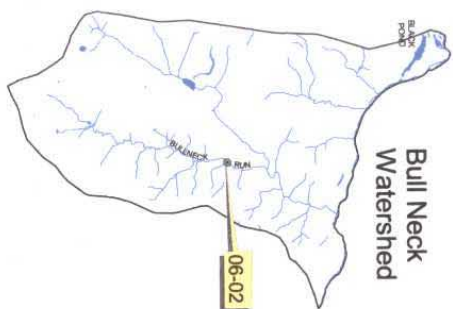
Horsepen Creek
Watershed



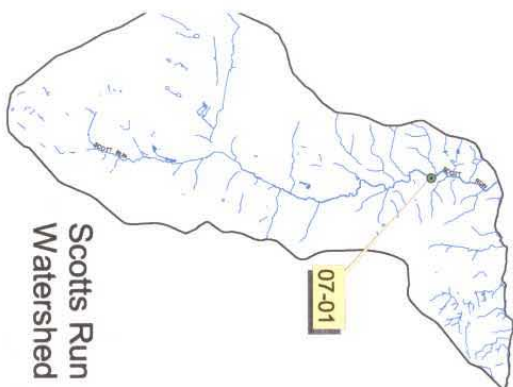
Sugarland Run
Watershed



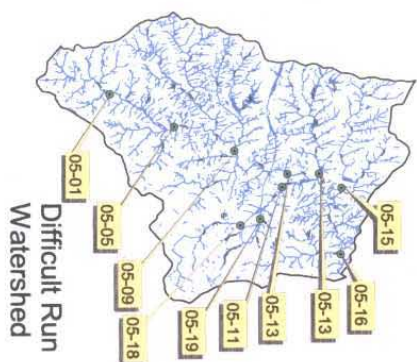
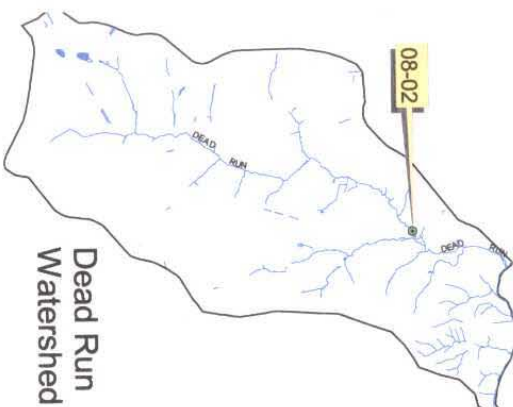
Bull Neck
Watershed



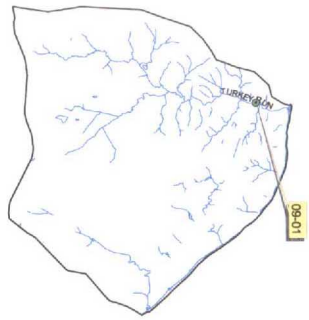
Scotts Run
Watershed



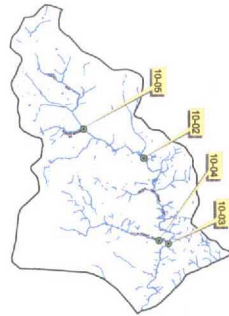
Dead Run
Watershed



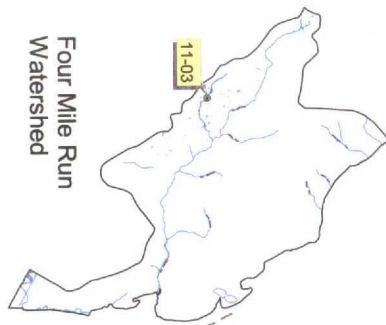
Turkey Run Watershed



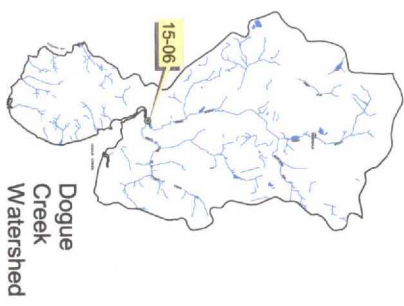
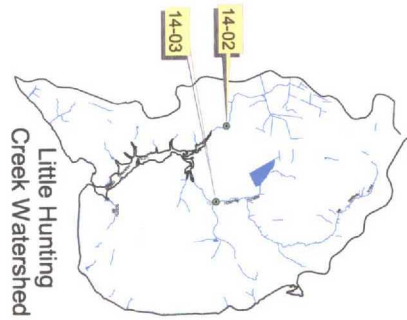
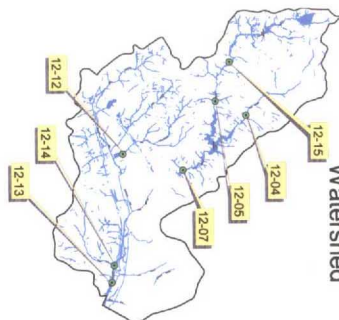
Pimmit Run Watershed



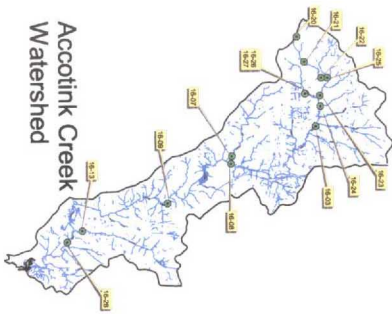
Four Mile Run Watershed



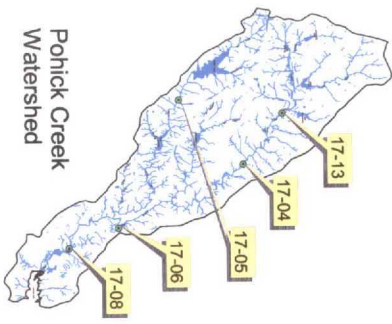
Cameron Run Watershed

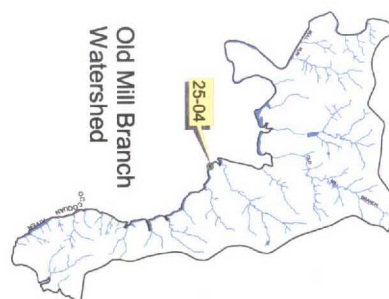
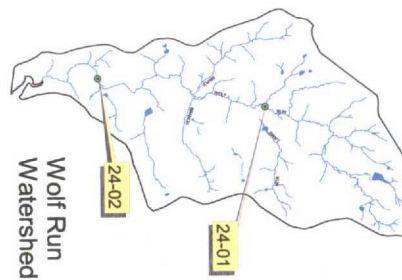
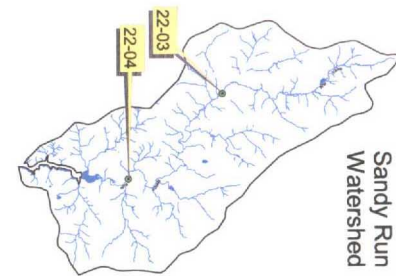
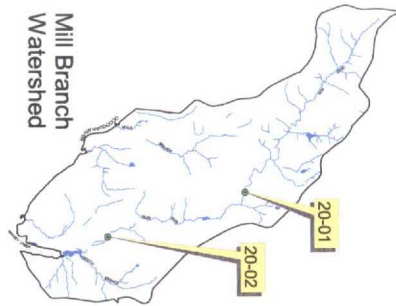


Accotink Creek Watershed



Pohick Creek Watershed





Popes Head Creek Watershed

